STUDY OF THE EFFECT OF OBESITY ON IMMUNE CELLS ACTIVITY AND CARDIOVASCULAR DISEASE RISK IN EL-OUED (ALGERIA) WOMEN

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ABSTRACT

Objective: This study was conducted to find out the effect of obesity on immune cells activity and some biochemical markers in women.

Methods: The experimentation is carried out on 30 voluntary individuals were divided into two groups; 15 women with obesity (Body Mass Index [BMI]>30) were selected, On the other hand, we took 15 witnesses (BMI<30). All the volunteers were subjected to estimate the lipid profile, biochemical, and hematological parameters.

Results: Results obtained show that there was a significant increase of blood glucose ($p<0.05$), triglyceride ($p<0.05$) and uric acid ($p<0.001$) and no significant change of other biochemical markers in obese people's group when compared to the control subjects. In addition, the hematological results demonstrated that there was a significant decrease ($p<0.05$) of lymphocytes, hemoglobin, hematocrit, and mean corpuscular volume levels ($p<0.01$) in women with obesity compared to the controls.

Conclusion: Our study reveals that the obesity may be induce the sever alteration in lipid profile which cause the cardiovascular risk for this population. In addition, the obesity causes a remarkable change in some biochemical markers and blood constituent's anemia or other metabolic disorder in the body.

Keywords: Obesity, Immune cells, Biochemical markers, Women.

INTRODUCTION

"Globesity" is a word used by the World Health Organization (WHO) to describe the global epidemic of overweight and obesity, this latter considered like one of the most important health problems in the many countries [1]. Obesity is the convergence of environmental, genetic, and human behavior factors, and it may also be the result of an energy imbalance in the body [2]. Where the degrees of obesity appear on the person if body mass index (BMI) >30, this indicator is calculated by dividing the weight in kilograms by the square of the height in meters [3]. Obesity and overweight have been linked to various health disorders, including breast cancer [4]. Furthermore, the latest studies related to Coronavirus disease-19 have shown that diabetes is a major risk factor for developing disease symptoms in this group [5]. Hebce, obesity has a share in the evolution of the virus and also considered like cause of cancer, this latter is the second cause of death in the world after cardiovascular disease [6] and because it occurs with depression frequently [7]. It is also considered alongside metabolic diseases, diabetes, and all conditions that are characterized by abdominal fat, are well-recognized risk factors for sexual dysfunction in both sexes [8].

The number of people in the world who are obese or overweight is estimated at more than 2.1 billion, which is considered one of the most important causes of death in the world, with an annual rate of more than 3.4 million deaths [9]. We can take some possible controls for obesity such as: Physical activity, A reduction in food intake alone is seldom effective in reduce of weight, and unless accompanied by some daily physical activities to increase energy expenditure [10]. Furthermore, the role of aqueous plant extract of *P. olercea* was reached 3 years before the current time, in reducing the levels of fat and sugar in the blood that is why it plays an important role against the development of obesity [11]. The many effects of obesity on human health prompted

us to complete a study that aimed at evaluate the effect of obesity on immune cells activity and some biochemical parameter in women of El-Oued region.

METHODS

Ethical clearance
Ethical approval was requested and approved by the Ethics Committee of the Department of Cellular and Molecular Biology, Faculty of Natural Sciences and Life, University of El Oued.

Study subject
The study was conducted on 30 volunteers, whose ages ranged from 26 to 63 years. It is divided into two groups that correspond in the age, 15 of them are obese women (BMI >30) their mean age is 44.07±12.52 years old. On the other hand, there are 15 other women who are not obese (BMI<30 their mean age is 44.00±12.03 years old. All the volunteers (control and patients) in this study live in the El Oued area located in the southeast of Algeria.

Inclusion and exclusion criteria
About inclusion criteria for obesity, we chose women who were apparently obese and then confirmed this by calculating the BMI. Women who have a BMI >30 were organized for the study.

This means that we selected women with a BMI of <30 and outwardly healthy as controls, between 16.66 and 27.18. In our study, we excluded pregnant women or women with chronic diseases.

Laboratory investigations
Blood samples were collected and placed into containing tubes. Blood was transferred into EDTA tubes for hematological markers and the

serum was obtained after centrifugation. Using a machine named NE 200 and its Model Nuve at 3000 tour for 5 min, Hematological analysis (FNS) is performed by the hematology

Auto analyzer (name: BC – 2800, model: Mindray). As for the rest of the analyses biochemical, it is usually performed using Spinreact reactive little is used Biomaghreb reactive and appareile of spectrophotomètre (name: BA- 88A, model: Mindray)

Statistical analysis

This study was prepared using MiniTab program. And express the results an average Mean±ES (standard deviation). We also GOT p value after comparing the average values of the patients with the average of the control values whereas the difference gets bigger whenever $p<0.05$.

RESULTS

Descriptive of study population

The study was conducted in state of El-Oued - the Public Institution for Slave Health - Saad Al-Amamrah in Dabila – multi service in Hassani Abdul Karim, at the level of the medical laboratory. The number of women in our study reached 15 sick women suffering from obesity and 15 other women who were not obese. The results obtained show that there is no significant difference concerning mean age, and the length. In contrast to the weight and the BMI, which appear with a very wide difference (Table 1).

Biochemical markers

The results obtained showed great agreement on the level of bilirubin total in obese and control women, followed by levels of GOT Least compatible then levels of GPT, calcium, bilirubin direct. Then the cholesterol results (p=0.056) show very little convergence between the two groups, because it takes higher levels in patients than for the control women and the levels of blood sugar (0.020) and triglycerides (0.014) differ between the two groups. And uric acid values are completely different (Table 2).

Hematological markers

Our results showed consistent values for total white blood cells, followed by levels of monocytes and granulocytes least compatible in obese and control women. Then, the total red blood cells results (p=0.189), while the values of lymphocytes (p=0.035). It is higher levels when obese women. Hemoglobin (p=0.043), mean corpuscular volume

Table 1: Description of study population

Parameters	Control group (n=15)	Patient group (n=15)	p-value
The Age	44.00±12.03	44.07±12.52	0.984
Body weight	70.67±8.81	112.13±19.92	0.000
Length	1.5800±0.0672	1.5873±0.0644&	0.666
Body mass index	22.428±3.166	35.27±6.65	0.000

Table 2: Levels of biochemical analysis in control and obese patients

Parameters	Control group (n=15)	Patient group (n=15)	p- value
Blood sugar (g/l)	0.8145±0.0520	1.182±0.541	0.020
Serum Total cholesterol (g/l)	1.6100±0.1947	1.7807±0.3048	0.056
Serum triglycerides (g/l)	0.9169±0.3187	1.360±0.523	0.014
Serum Uric acid (mg/l)	26.04±5.74	43.11±11.49	0.000
Serum GOT (UI/l)	32.15±6.85	30.29±6.90	0.330
Serum GPT (UI/l)	31.70±9.72	26.87±11.22	0.118
Serum calcium (mg/l)	83.13±4.24	79.47±8.57	0.120
Serum Bd (mg/l)	0.8493±0.1092	0.7847±0.1718	0.167
Serum Bt (mg/l)	5.149±1.059	5.163±1.036	0.958

(MCV) (0.037), and hematocrit (0.049) are shown clear difference between obese and control women, where it appears at lower levels in obese women. And the most different values are values of platelets (p=0.001), it is high in patient women (Table 3).

DISCUSSION

Obesity has emerged as a complex metabolic disease characterized by abnormal or excessive fat (BMI≥30 kg/m^2) that may adversely affect health [12]. This explains the high level of triglycerides obtained in the obese women in our study. Cholesterol levels are also high, but significant. A large tissue mass needs more energy which was produced in addition to secondary products such as free-oxygen radicals, central obesity (excessive fat deposition intra-abdominally and in the abdominal wall subcutaneous tissue) also causes systemic release of adipose-derived inflammatory cytokines, which, in turn, cause oxidative stress (OS) and insulin resistance (IR). IR leads to higher circulating glucose, which itself increases OS, thus a vicious cycle is set up which can result in type 2 diabetes [13-15]. This translates into higher blood glucose values for obese women, which increases the risk of developing type 2 diabetes. On the other hand, the results showed an increase in the level of uric acid in obese women, which may explain the effect of this criterion on IR to reduce the urine excretion of uric acid. King *et al*. [16], clinical studies, too, indicate that the sufferer from gout tends to be overweight [17]. In addition, the inverse relationship between obesity resulting from imbalance in the irregular diet and immunity makes obese people more sensitive to infections, which makes them less responsive to vaccines [18]. There is also a close relationship between adipose tissue and chronic inflammatory processes that may affect infection resistance. White adipose tissue (WAT) is usually found at higher levels in obese people. Several studies show that WAT has many functions, including regulating inflammatory processes. When the body has an excess of WAT, chronic inflammation makes it difficult for the body to fight infection [19]. Adipocytes and osteoblasts are derived from a common multipotential mesenchymal stem cell [20]. White blood cell count was elevated in obesity [21], studies have found that, there is some sort of association between the increased number of immune cells and obesity as a result of a chronic inflammatory condition which is created by an increase in the production of cytokines by adipose tissue [22]. However, in our study, the white blood cell values did not show a significant difference. However, from the average values, we can notice their slight increase in the obese compared to the healthy. With the exception of monocyte, it showed a significant difference and was low in obese people. The induction of cytokines such as Tumor necrosis factor-α and interleukin (IL-6) is involved in transcriptional reprogramming induced by CIH [23]. On the one hand, it has been shown that the administration of IL-6 in the human body increased the number of circulating platelets, and on the other hand, obesity has been shown not to be associated with increased platelet activation [24]. And because obesity means an increase in fat tissue, this means an increase in the level of platelets. Study of Sen *et al*., (2009) conducted that increasing tertiles of abdominal height were significantly associated

Table 3: Hematological parameters levels in control and obese patients

Parameters	Control group (n=15)	Patients group (n=15)	p-value
Total WBC count (×10^9/L)	7.37±1.27	7.56±2.39	0.767
Lymphocytes (×10^9/L)	2.89±0.88	2.493±0.665	0.035
Monocytes (×10^9/L)	0.09±0.49	0.46±0.10	0.242
Granulocytes (×10^9/L)	3.98±0.83	4.60±2.02	0.256
Hb (g/dL)	10.39±0.73	9.60±1.38	0.043
Total RBC count (×10^{12}/L)	4.02±0.31	3.86±0.44	0.189
Hematocrit %	34.16±2.29	31.65±4.52	0.049
MCV	85.22±3.71	81.95±5.48	0.037
platelets (×10^9/L)	229.9±69.5	295±63	0.001

Hb: Hemoglobin, WBC: White blood cells, RBC: Red blood cells, MCV: Mean corpuscular volume

with increasing levels of mean platelet count in women [25]. About 50% of total body mass is fat tissue which may stimulate immune cells to the innate and adaptive response [26]. When the red blood cell count or hemoglobin concentration decreases, anemia results, which affects the amount of oxygen in the cells, which affects their energy levels [27]. This means that obese women suffer from anemia compared to healthy women, p value of hemoglobin levels is 0.043<0.05. This decrease is also accompanied by a decrease in the level of values: Hematocrit, MCV, although red blood cell values are close between the two groups.

CONCLUSION

Based on the results obtained during our study and obtained in the scientific tribal studies, based on the results we obtained during our study and that we obtained in the scientific tribal studies. We can say that obesity causes many diseases for women. It is also responsible for response immune changes and disturbances of some biochemical parameters which can lead to several metabolic diseases.

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AUTHORS' CONTRIBUTION

All the authors have contributed equally in the research.

CONFLICTS OF INTEREST

There are no conflicts of interest in my study.

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None.

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